PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Michiharu YAMAMOTO et al.

Group Art Unit: 1742

Application No.: 10/076,433

Examiner: S. IP

Filed: February 19, 2002

Docket No.: 111996

For: HIGH STRENGTH TITANIUM COPPER ALLOY, MANUFACTURING METHOD THEREFOR, AND TERMINAL CONNECTOR USING THE SAME

REQUEST FOR RECONSIDERATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In reply to the August 31, 2005 Office Action, reconsideration of the rejection is respectfully requested in light of the following remarks. Claims 1, 2, 4-17, 19-21, 23, 25-27 and 29 are pending in this application.

The Office Action rejects claims 1, 4, 10, 12 and 16 under 35 U.S.C. §103(a) over Ikushima et al. (U.S. Patent No. 4,599,119) in view of Nagarjuna et al. ("Effect of Prior Cold Work on Mechanical Properties, Electrical Conductivity and Microstructure of Aged Cu-Ti Alloys", Journal of Material Science 34 (1999) page 2929-2942). The rejection is respectfully traversed.

The Office Action replies to the arguments presented in the last paragraph of page 9 of the July 5, 2005 Amendment by arguing that "Applicants have not substantiated their position by factual evidence in Declaration" (Office Action, page 3, lines 11-12).

In order to provide factual evidence, a reference is submitted in an Information Disclosure Statement (IDS) submitted concurrently with this Amendment and titled "Precipitation Kinetics in a Cu-4 mass% Ti Alloy" by Hernandez-Santiago et al. For the Examiner's convenience, a copy of this reference is also attached to this Request.

As shown in the specification at, for example, Table 3 and Table 4, examples No. 1-No. 24 show a bending radius ratio not causing cracks expressed by "a" and 0.2% proof stress expressed by "b", and a and b satisfy the relationship "$a \leq 0.05.b - 40$". In contrast, in comparative examples No. 27 and 28, the strength is lower than in the alloy of the examples No. 1-No. 24, the bending radius ratio in examples No. 27 and 28 is large, and the bending properties of these comparative examples are poor. The reasons for the large bending radius ratio and the poor bending properties of comparative examples No. 27 and 28 is that the titanium content is 5.5 % and 4.5%, respectively. In support for this assertion, Applicants submit the Hernandez-Santiago reference, which teaches, in, for example, Fig. 6, the conditions in which titanium segregates and precipitates at grain boundaries. Specifically, as shown in Fig. 6c, titanium precipitates only at grain boundaries and is not dispersed in the matrix, which causes an increase in the strength and a deterioration of the workability of the alloy. Moreover, in the examples of Figs. 6e and 6f of Hernandez-Santiago, the annealing of those alloys was performed at 873K, which is equivalent to 600°C. Similarly, in Ikushima, the annealing of the alloy was performed at 500-700°C, and the titanium content is 4% (col. 3, lines 7-11). Accordingly, because the titanium content and the annealing temperature in Ikushima are similar to the titanium content and the annealing temperature in Hernandez-Santiago, these alloys are similar to comparative examples No. 27 and No. 28 disclosed in the specification, and thus, the Ikushima alloy does not fulfill the relationship "$a \leq 0.05.b - 40$" as recited in the independent claims. Thus, Ikushima fails to disclose or suggest the features of independent claims 1 and 12.

Nagarjuna teaches a copper titanium alloy at 2.7% titanium and 5.4% titanium (Abstract). Moreover, Nagarjuna teaches a titanium copper alloy having high electrical conductivity of about 14.5% IACS and 25% IACS for these alloys (Abstract). However, as indicated in Fig. 4 of Nagarjuna, although high electrical conductivity can be obtained by long time aging processes, the tensile strength is lowered by these processes. In contrast to Nagarjuna, the claimed alloy can balance high electrical conductivity and high tensile strength, as recited in independent claims 1 and 12.

Fig. 4 of Nagarjuna shows aging temperatures of 400°C and 450°C, and reduction ratios of 0%, 34% and 40%. Also, Figs. 1-3 show the hardnesses and tensile strengths that correspond to these conditions. For example, Fig. 3b shows a change of proof stress, and shows that a proof stress of 800 MPa or more cannot be obtained with a reduction rate of 40% of more in the condition shown in Fig. 4. Furthermore, the titanium copper shown in Tables 1 and 3 contain larger amounts of titanium than the claimed amount of titanium. Therefore, the electrical conductivity of these titanium coppers cannot correspond to the claimed electrical conductivity of the alloy. However, the Cu-2.7 Ti alloy exhibits a high enough electrical conductivity, and was obtained by aging at 450°C for 24 hours. Nagarjuna teaches that although the electrical conductivity is comparable to the claimed electrical conductivity, the strength may be reduced because of aging (page 2938, left column, lines 1-3). Therefore, the proof stress of the Cu-2.7 Ti alloy in Nagarjuna is lower than 800 MPa. Finally, the electrical conductivity that corresponds to an alloy with a proof stress of 950 MPa is 12% IACS, as indicated in Table 2 of Nagarjuna. Thus, Nagarjuna fails to cure deficiencies in Ikushima in disclosing or rendering obvious the features of independent claims 1 and 12.

Accordingly, for at least these reasons, a combination of Ikushima and Nagarjuna would not arrive at the subject matter of independent claims 1 and 12. Thus, independent

claims 1 and 12, and their dependent claims, are patentable over Ikushima and Nagarjuna. Accordingly, withdrawal of the rejection of the claims under 35 U.S.C. §103(a) is respectfully requested.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1, 2, 4-17, 19-21, 23, 25-27 and 29 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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JAO:TMN/tje

Attachment:
"Precipitation Kinetics in a Cu-4 Mass % Ti Alloy", Hernandez-Santiago et al.

Date: November 30, 2005

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